EXHIBIT 1
Part 1 of 2

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for

Controlling and manipulating groupings in a multi-zone music or media system

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Signed: / joe zheng /
Joe Zheng

Controlling and manipulating groupings in a multi-zone music or media system

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to the area of consumer electronics, and more particularly, relates to techniques for controlling and manipulating groupings in a multi-zone music or media system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention, also in Appendix A and B, is presented largely in terms of procedures in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. 1 shows an exemplary configuration **100** in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples **102**, **104** and **106** are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration **100** represents a home. Thus, the zone player **102** and **104** may be located in two of the bedrooms respectively while the zone player **106** may be installed in a living room. All of the zone players **102**, **104** and **106** are coupled directly or indirectly

to a data network **108**. In addition, a computing device **110** is shown to be coupled on the network **108**. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network **108** as well.

The network **108** may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players **102**, **104** and **106** are coupled to the network **108** by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players **102**, **104** and **106** are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is

formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. 2A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a digital signal processing module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. 1) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the

interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files that may be retrieved for modification at any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. 1, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio

signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the digital signal processing module **212** may be implemented within the audio processing circuit **210** or as a combination of hardware and software. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. 2B, there is shown an example of a controller **240**, which may correspond to the controlling device **140** or **142** of FIG. 1. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. 2A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players in a group. In another

embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a "zones" button **244**, a "back" button **246**, a "music" button **248**, a scroll wheel **250**, "ok" button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user's selection. In one embodiment, the "zones" button **244** activates a zone management screen or "Zone Menu", which is described in more details below. The "back" button **246** may lead to different actions depending on the current screen. In one embodiment, the "back" button triggers the current screen display to go back to a previous one. In another embodiment, the 'back" button negates the user's erroneous selection. The "music" button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player's music queue for playback.

The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The "ok" button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254,** which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. 2C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. 2B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276**

executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. 1. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone players can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the "zones" button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A "Zone Menu" is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a "Link Zones" or "Add Zone" soft button, or de-grouping a zone group by activating an "Unlink Zones" or "Drop Zone" button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. 2B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for 'joining' zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

- Bathroom
- Bedroom

- Den
- Dining Room
- Family Room
- Foyer

If the user wishes to link 5 of the 6 zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite consuming.

According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to as a zone scene or scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes in for the grouping are determined.

For instance, a "Morning" zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. 3 provides an illustration of one zone scene, where the left column shows the starting zone grouping – all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones.

Expanding this idea further, the Zone Scene can be set to create multiple sets of linked zones. For example the "Morning Mode" scene would create 3 separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own

group, and the outside zones (in this case the patio) would move into a group of its own.

Optionally, a system may be supplied with a command that links all zones in one step. This may be a simple form of a zone scene. In one embodiment that extends to more than just linking zones together. After linking the appropriate zones, a zone scene command could apply the following attributes:

1. Set volumes levels in each zones (each zone can have a different volume)
2. Mute/Unmute zones.
3. Select and play specific music in the zones.
4. Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)
5. Set the music playback equalization of each zone (bass treble) etc.

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone Scene is set to apply at 8:00am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration.

Annexed hereto is an Appendix A providing examples to teach and refer to various features, detailed designs, uses, advantages, configurations and characteristics in one embodiment of the present invention.

Annexed hereto is also an Appendix B providing examples to teach and refer to various features, detailed designs, uses, advantages,

configurations and characteristics using clock in one embodiment of the present invention.

One of the features in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network.

The processes, sequences or steps and features discussed above and in the appendixes are related to each other and each is believed independently novel in the art. The disclosed processes and sequences may be performed alone or in any combination to provide a novel and unobvious system or a portion of a system. It should be understood that the processes and sequences in combination yield an equally independently novel combination as well, even if combined in their broadest sense; i.e. with less than the specific manner in which each of the processes or sequences has been reduced to practice in the attached appendix.

The forgoing and attached are illustrative of various aspects/embodiments of the present invention, the disclosure of specific sequence/steps and the inclusion of specifics with regard to broader methods and systems are not intended to limit the scope of the invention which finds itself in the various permutations of the features disclosed and described herein as conveyed to one of skill in the art.

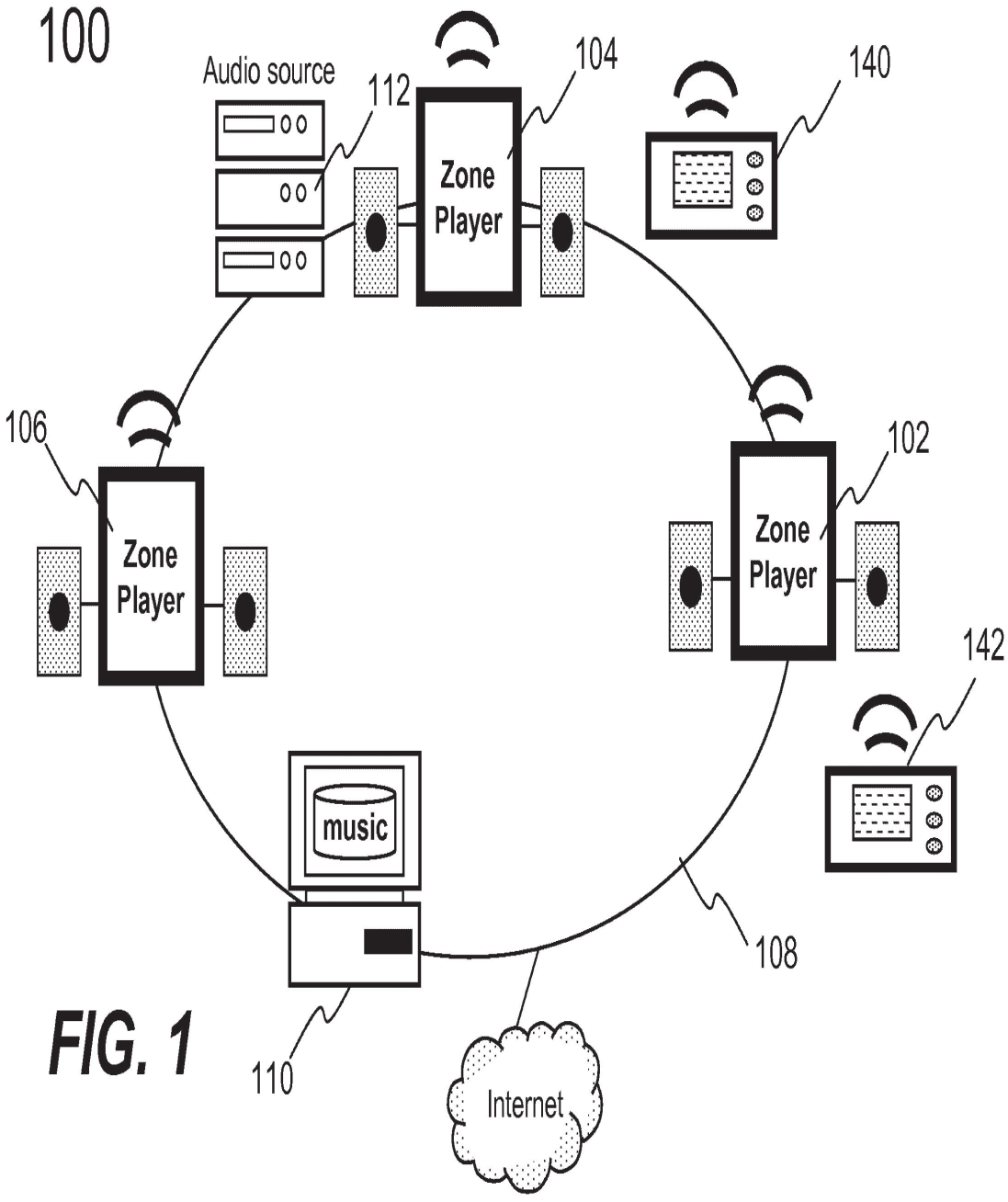

100
Audio source
112
104
Zone Player
140
106
Zone Player
102
Zone Player
142
music
108
110
Internet

FIG. 1

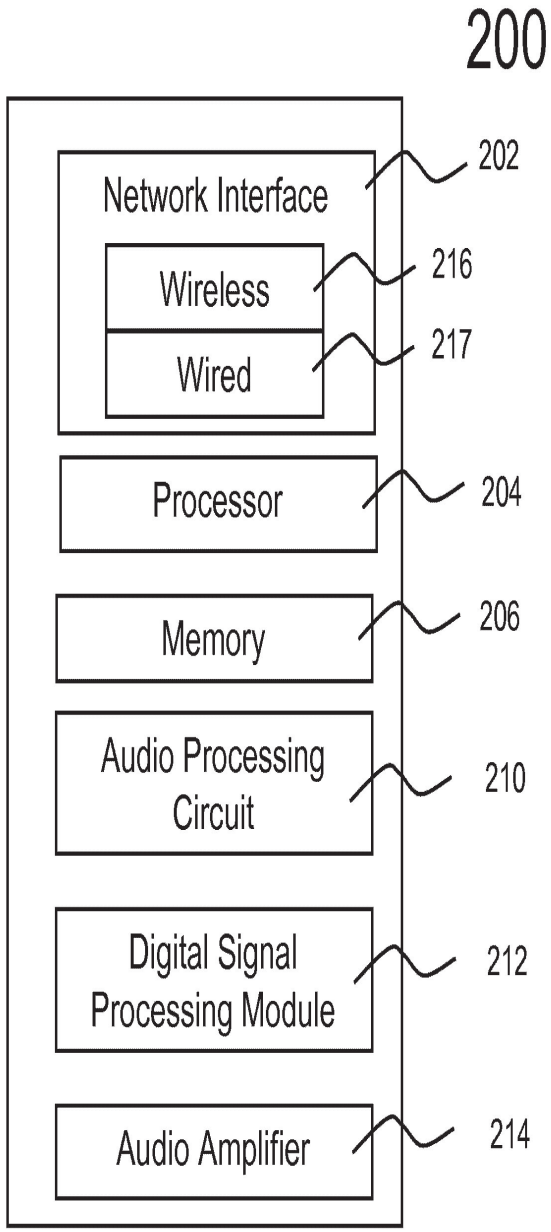

200
Network Interface
202
Wireless
216
Wired
217
Processor
204
Memory
206
Audio Processing Circuit
210
Digital Signal Processing Module
212
Audio Amplifier
214

FIG. 2A

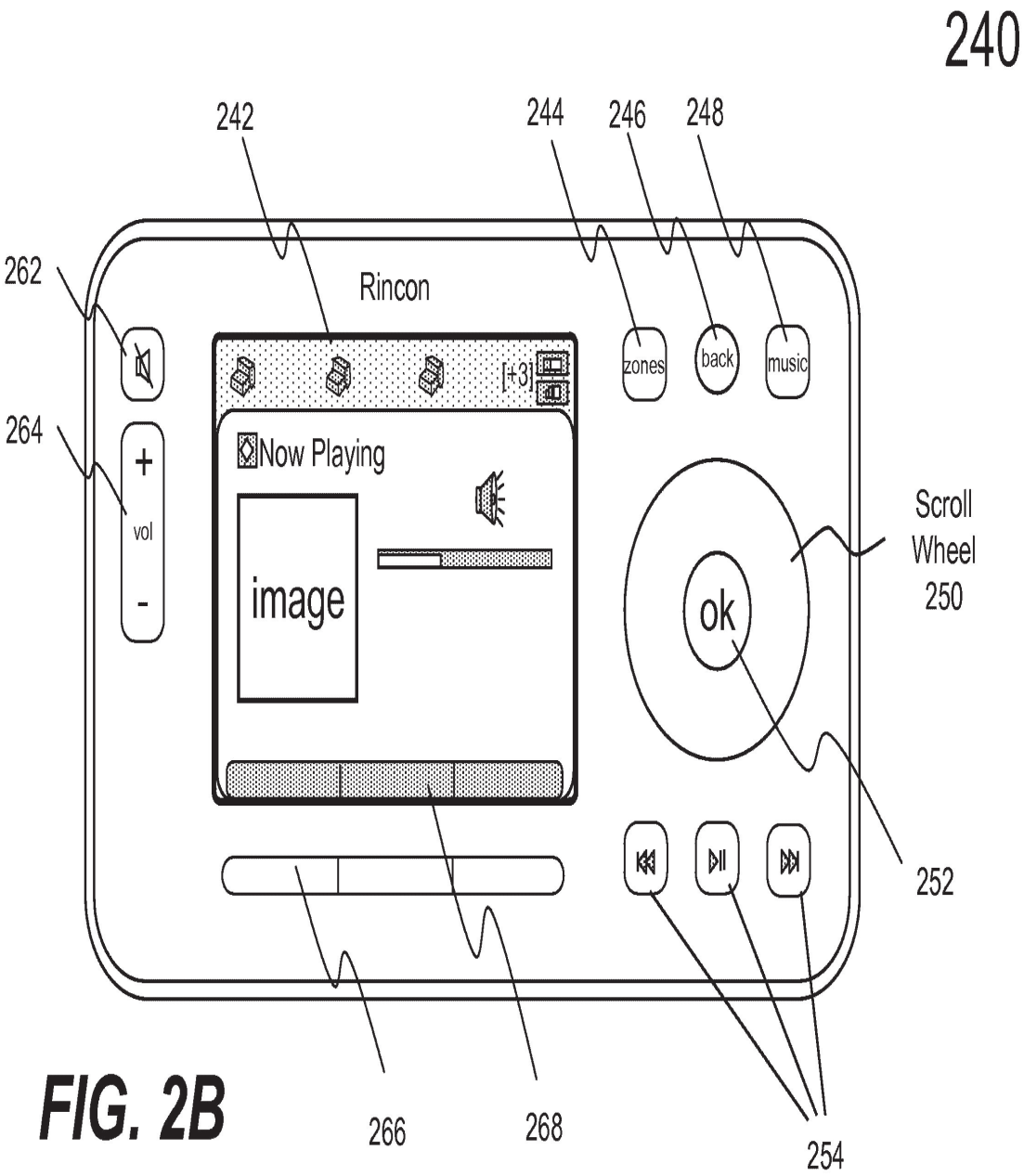

240
242
244
246
248
262
264
Rincon
zones
back
music
Now Playing
image
vol
+
-
ok
Scroll
Wheel
250
252
254
266
268

FIG. 2B

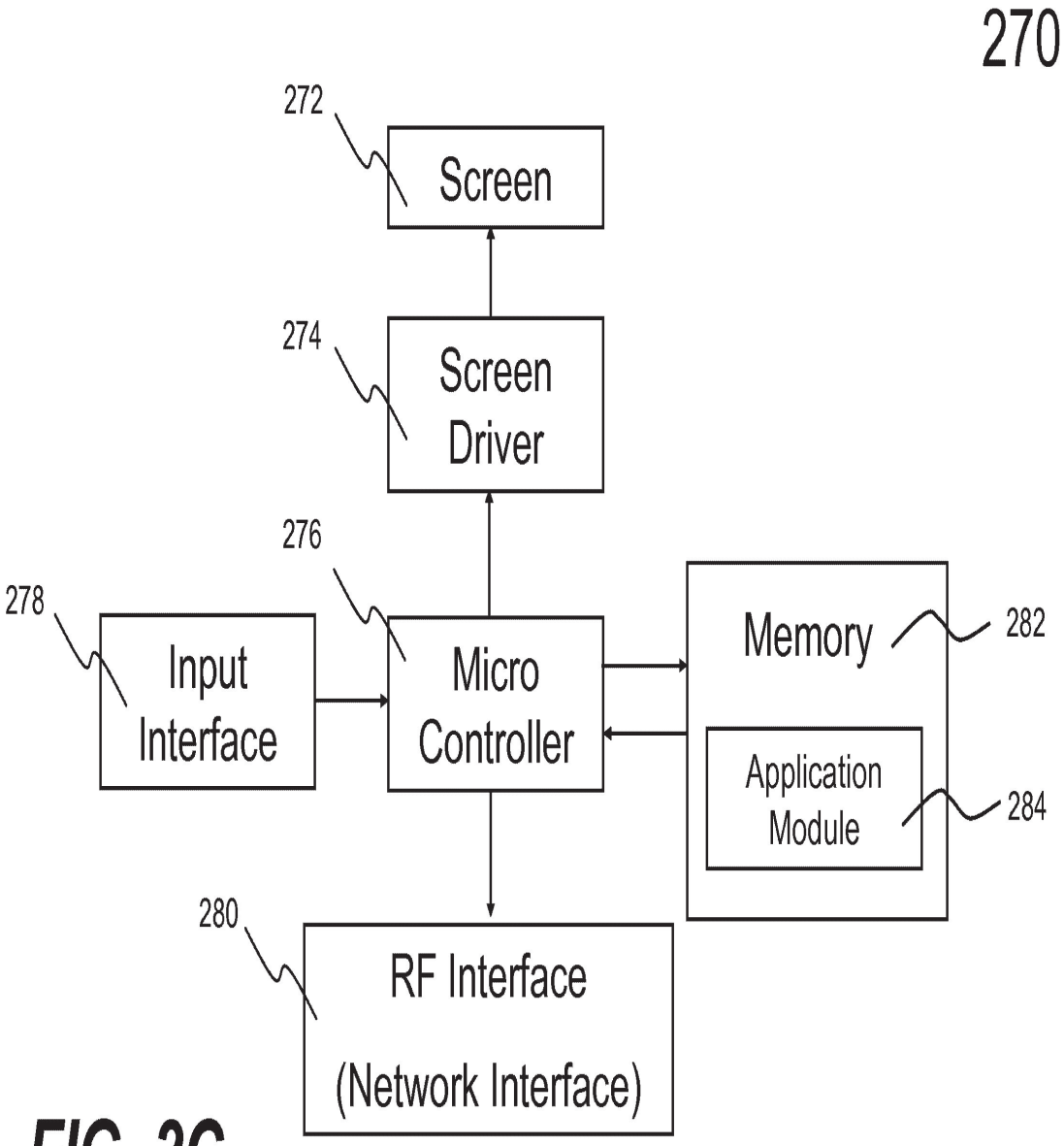

270
272
Screen
274
Screen Driver
276
278
Input Interface
Micro Controller
Memory
282
Application Module
284
280
RF Interface
(Network Interface)

FIG. 2C

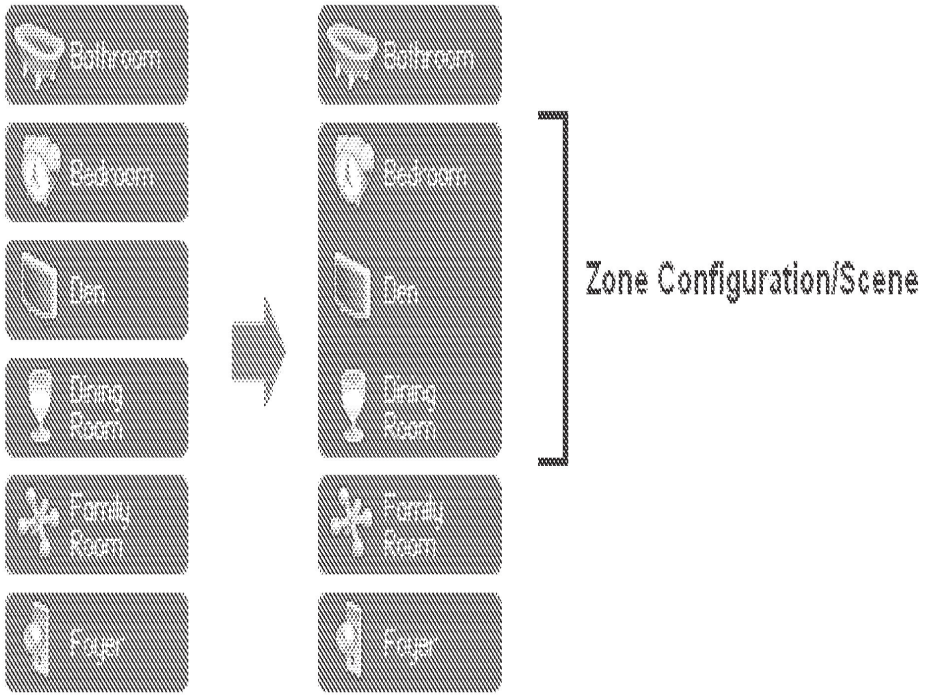

Bathroom
Bedroom
Den
Living Room
Family Room
Foyer
Bathroom
Bedroom
Den
Living Room
Family Room
Foyer
Zone Configuration/Scene

FIG. 3

Appendix A

Table of Contents

1 Introduction

The Zone Scene feature allows the user to arrange the zones into groups using one single command. However, the Zone Scene feature is much more flexible and powerful.

Currently in the Sonos UI, zone groups are created by manually linking zones one at a time until the desired zone grouping is reached.

For Example

Start with **Living Room**

- Link the Kitchen to the Living Room to make a group of (**Living Room** + **Kitchen**)
- Then link the Den to the (**Living Room** + **Kitchen**) to make a group of (**Living Room** + **Kitchen** + **Den**)

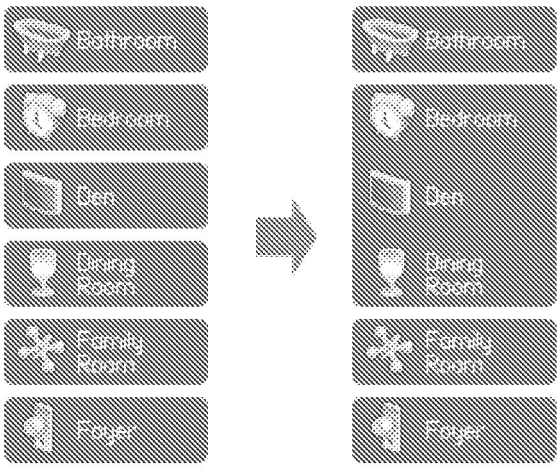
The Zone Scene feature would allow the user to create a group of (**Living Room** + **Kitchen** + **Den**) with one command.

1.1 Setting a Zone Scene

1.1.1 Simple Scenes

Simple scenes allow the user to set up a single zone group per scene.

For example:
"Morning Scene" would group Bedroom + Den + Dining Room, but would leave all other zones in the house untouched.



Note: Zones do not need to be separated before the Scene is invoked.

1.1.2 Advanced Scenes

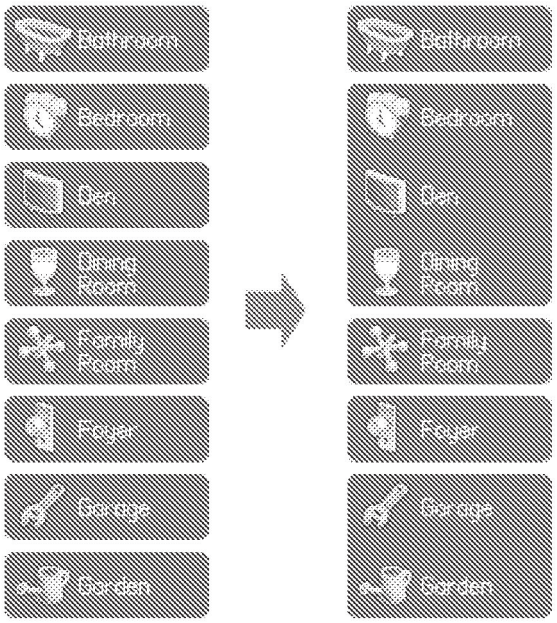
User can define multiple groups to be gathered at the same time.

For example: "Evening Scene" should link the following zones

- **Group1**
  - Bedroom
  - Den
  - Dining Room

- **Group 2**
  - Garage
  - Garden

- **And finally**, Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.



Note: Zones do not need to be separated before the Scene is invoked.

1.1.3 What happens to the Music that's already playing when a Zone Scene is started.

If no music is playing in any Zone – then the zones will simply link in a group.

If music is playing in one or more zones there are several possibilities (TBD)

1. The Music Queue in the zone group that was formed by the Zone Scene will be empty. In other words – the music will stop in any room that is part of the Zone Scene. This is the simplest solution, but may lead to frustration.

2. The user gets to choose from which of the ;joining' Queues the new zone group should play. This could be in the form of a dialog:

What should the new Zone Group play?
No Music
Track 1
Track 2
Radio Station A

Note that this method would only be useful (and possible) with simple Zone Scene grouping. With Advanced Zone Scene groupings, this dialog would become much too complicated.

3. In the case where only one of the zones in the new group was playing music, the new group should take the music (and Queue) of that zone.

2 Invoking a Scene

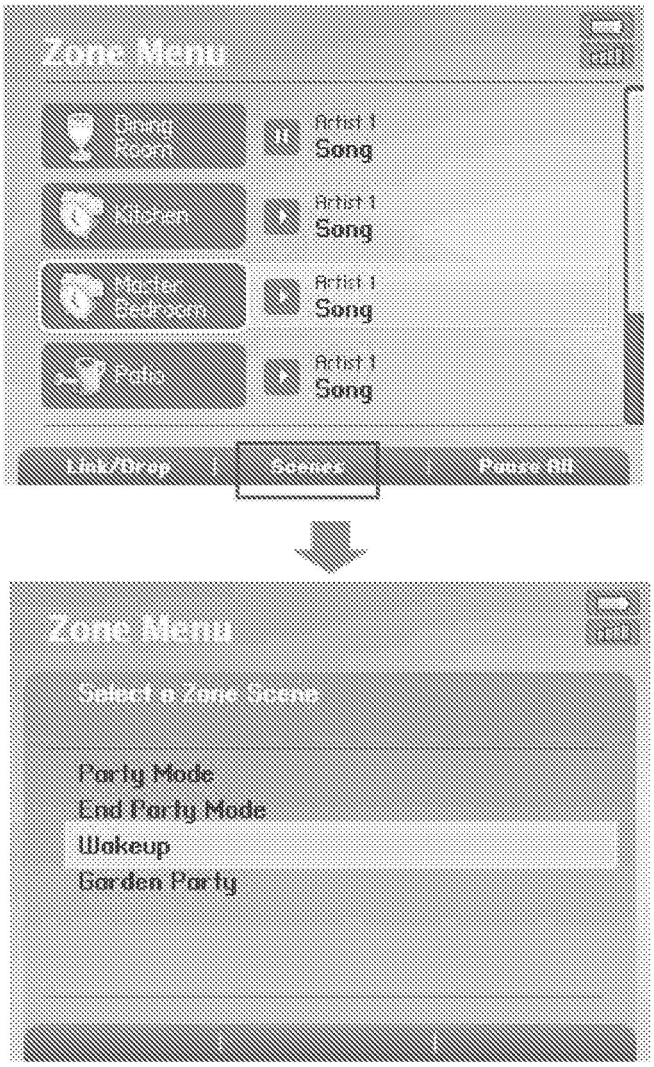
There are various user Interface methods for invoking a configuration on a Handheld Controller or Desktop Controller

2.1 Handheld Controller

2.1.1 Method 1: Include Scenes in the Zone menu

2.1.2 Method 2: Zone Scenes as a soft button

The Link/Drop Zone commands are placed under one softkey and the middle softkey now becomes "Scenes". Pressing the scene softkey will show the Scene menu where all the available scenes are shown.

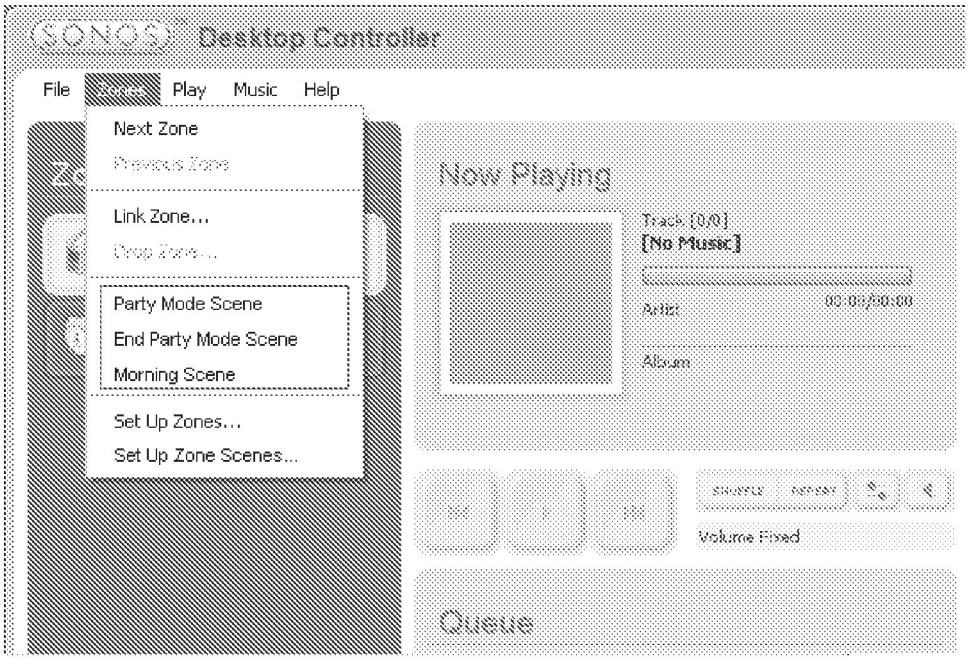


TBD: We could remove Pause All (and place it somewhere else. This would allow us to put Zone Scenes on the right soft button).

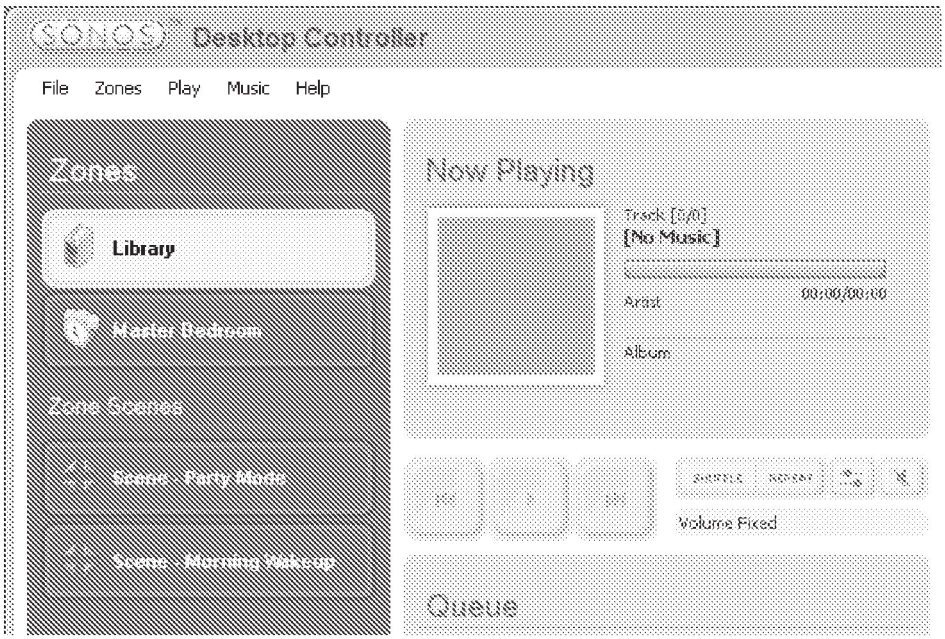
2.1.3 Method 3. Zone Scenes as part of "Link Zones" Dialog.

2.2 Desktop Controllers

2.2.1 Method 1: As part of 'Zones' application menu



2.2.2 Method 2: As part pf the Zones panel



3 Scene Setup

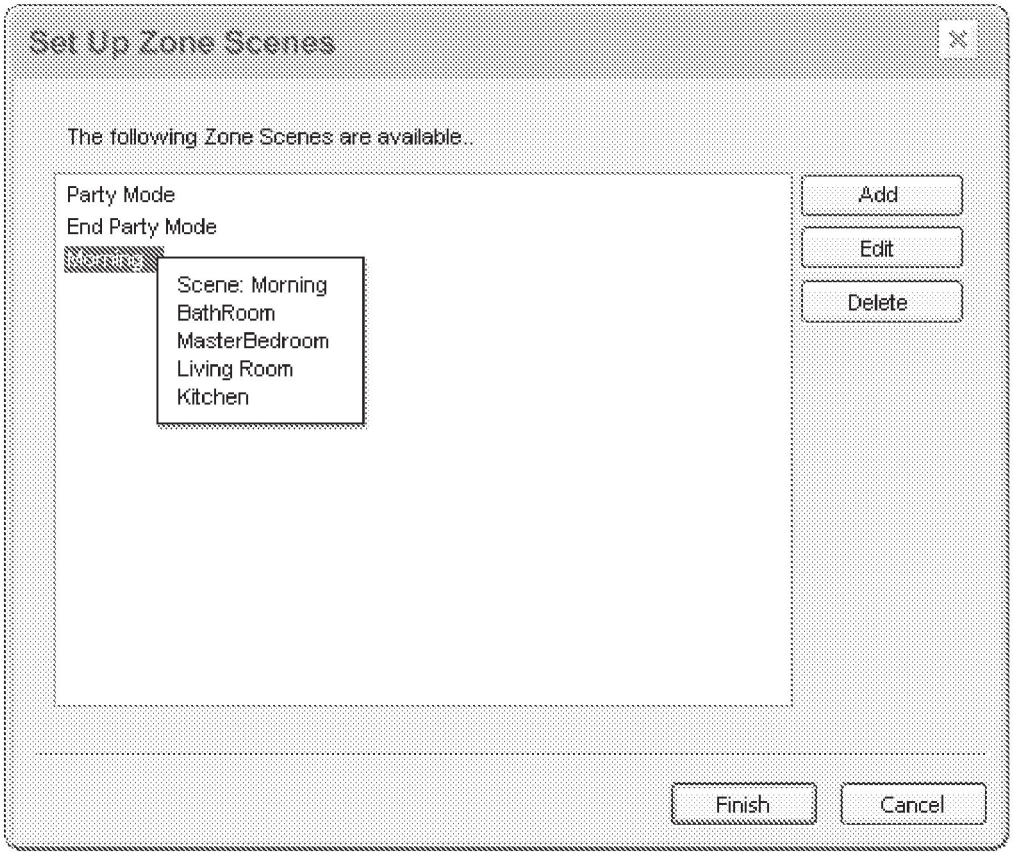
3.1 Handheld Controller

It is not expected that the Zone Scenes should be set up using the Handheld Controller

3.2 Desktop Controllers

Zone Scene Setup is available from the Zones menu on the DCRs.

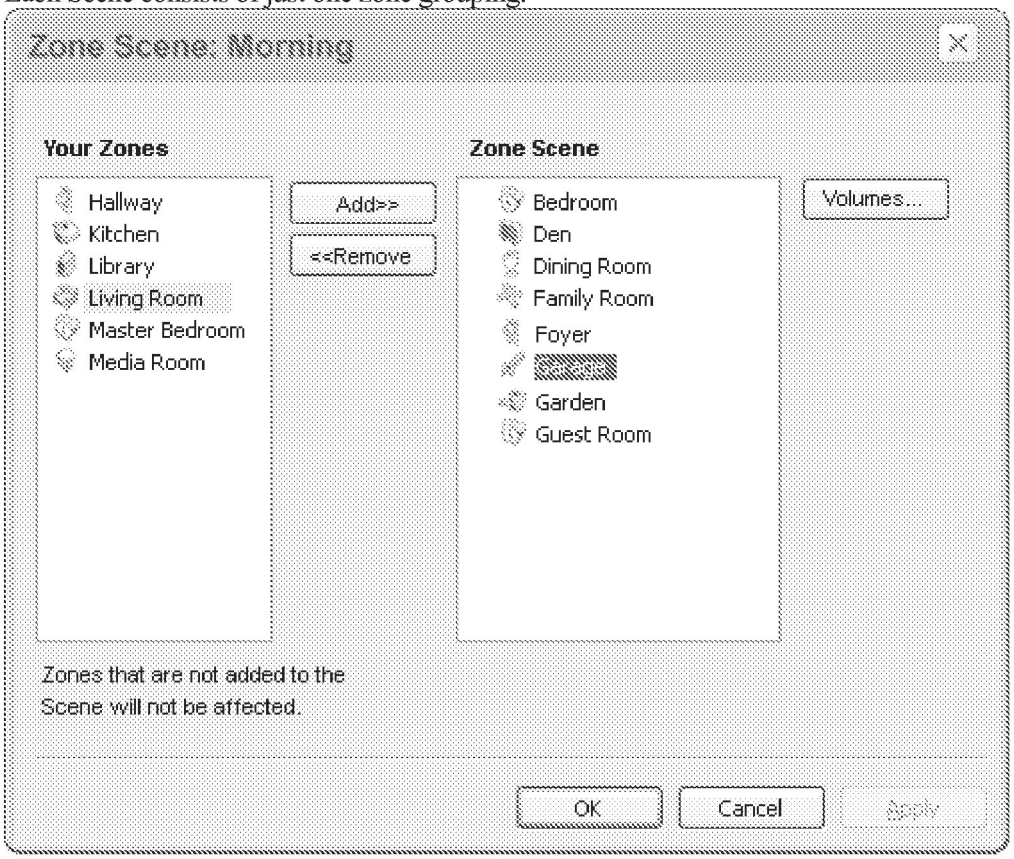
"Set Up Zone Scenes…" is available from the Zones menu.



- Zone Scenes can be Add, Edited or Deleted
- The tool tip shows an overview of the zones that make up a scene

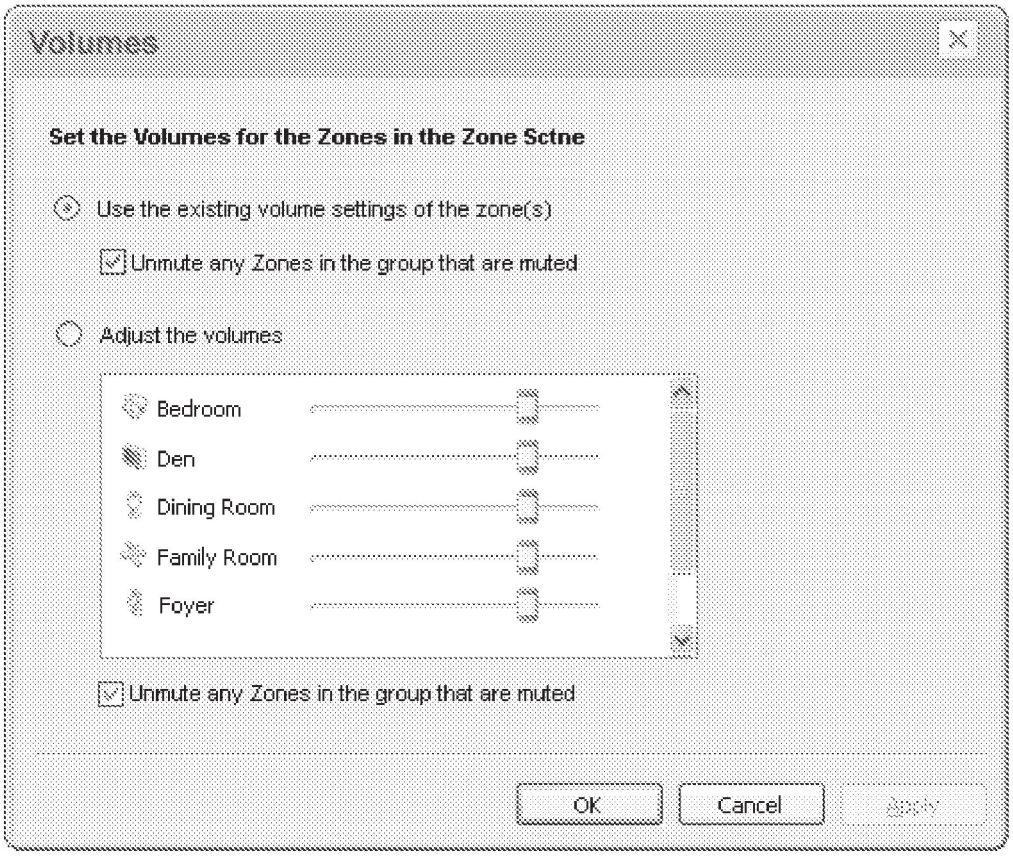
3.2.1 Simple Scenes

Each Scene consists of just one zone grouping.



- The panel on the left shows the available zones in the household.
- The panel on the right shows the Zones that will be grouped as part of this scene.
- The Add/Remove buttons move zones between the panels.
- Zones can be dragged between panels.
- The Zones that are not part of this scene will remain unaffected by the scene.

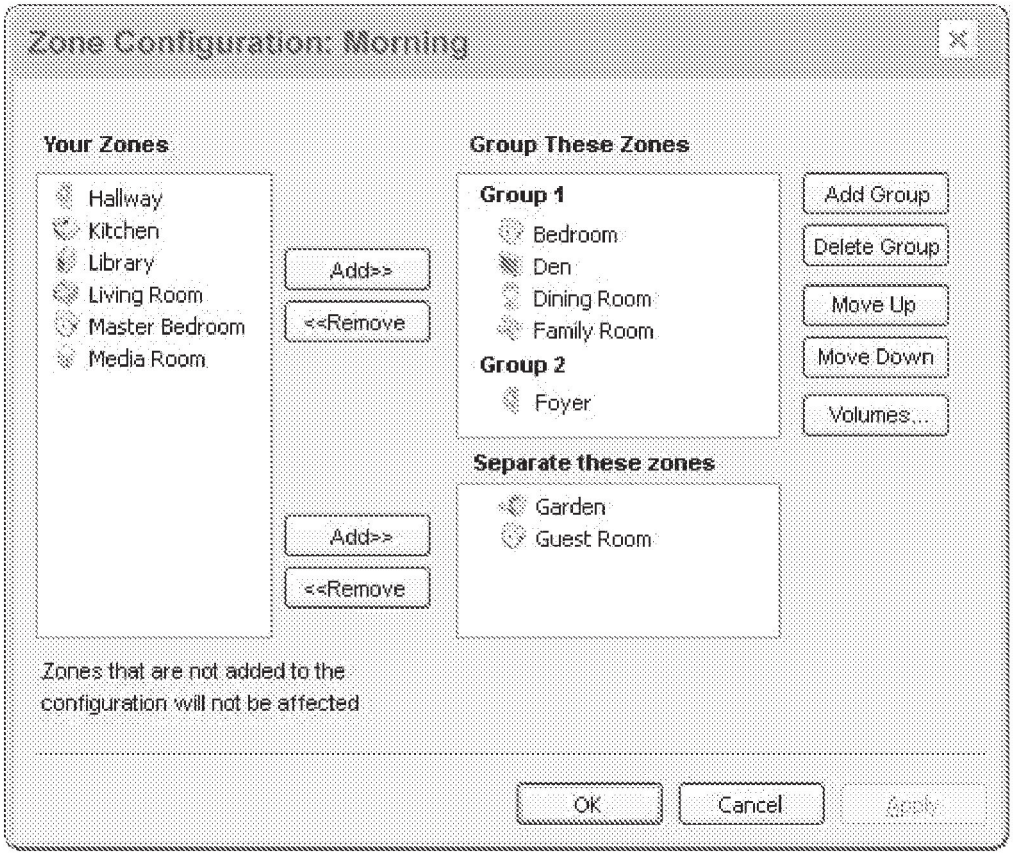
Volumes



- The 'Volumes…' button allows the user to affect the volumes of the zones when a Zone Scene is invoked.
- The Zones can be set to retain whatever volume that they currently have when the Scene is invoked.
- Additionally the user can decide of Volumes should be unmuted when the Scene is invoked.
- Alternatively, the user can define the Volume of each zone in the Zone Scene.

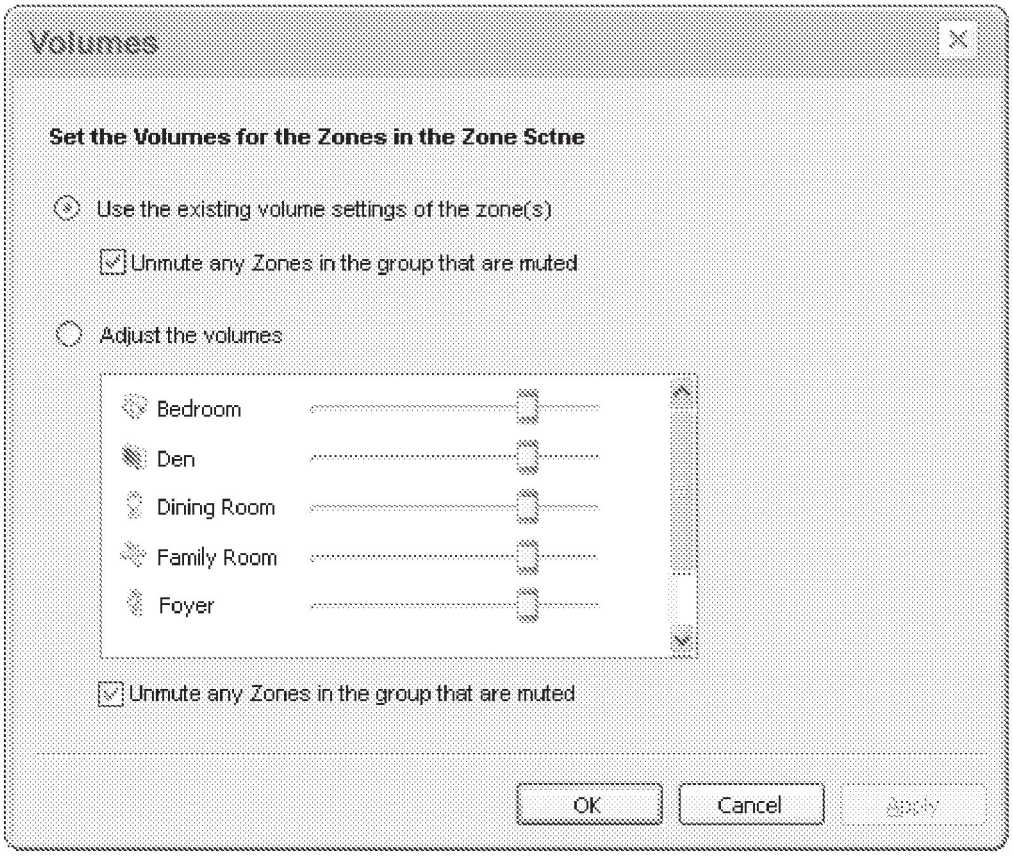
3.2.2 Simple Scene (each scene makes one zone group)

Each Scene can consist of multiple groupings. In addition zones can be separated if they were part of a group before the scene was invoked.



- Left panel shows the available zones in a system
- The upper right panel shows the zones that will be grouped as part of this configuration.
  - Multiple groups can be created with the "Add Group" button
  - Groups can be deleted using the "Delete Group" button
  - Zones can be moved between groups
- The lower right panel shows the zones that will be actively separated when the scene is invoked (if they were part of any before).
- Zones can be moved from the left panel to wither of the right panels using the "Add" buttons, or through drag and drop/
- Likewise, zones can be moved from either of the right side panels to the left panel using the "Remove" buttons, or through drag and drop.

Volumes



- The 'Volumes…' button allows the user to affect the volumes of the zones when a Zone Scene is invoked.
- The Zones can be set to retain whatever volume that they currently have when the Scene is invoked.
- Additionally the user can decide of Volumes should be unmuted when the Scene is invoked.
- Alternatively, the user can define the Volume of each zone in the Zone Scene.

3.3 Additional setup ideas

Capture a Zone Scene from an existing setup in the Zone Menu. Right click on a current Zone group and have a menu item “Make this group a Scene”.

4 Alternative Linking Methods

4.1 Multiple Select in Link and Drop Zone panels

This feature is an adaptation of the Link and Drop Zone feature.

Currently, as discussed in the introduction of this document, the current Link and Drop Zones features allow the user to link and drop Zones one at a time. This feature would allow the user to link and drop multiple zones in one screen.

Using this methodology, the action Link and Drop zones can be achieved on one screen. In addition, because of the flexibility of this UI, Music can easily be moved from one zone to another.

– The list of zones in the screen above includes ALL the zones in the system, including the Zones that are already grouped.

- User can check Zones that will be part of a zone group, and uncheck those that won't be part of a group
- Using this method it is possible to move music from one zone to another. For example, to move the music from the Living Room to the Kitchen
  - User is playing 'Radio 1' in the Living Room only
  - From the Zone Menu, press the Zone Linking soft button
  - Check the Kitchen, uncheck the Living Room
  - Hit the OK button
  - Result – Radio 1 is now playing in the Kitchen and not the Living Room (without interrupting the music).

5 Related Ideas

5.1 Zone Scenes that play music

In addition to the notion of Zone Scenes that contain information about Zone Groups and the Volumes of individual Zones in a group. It is also possible to extend the idea to enable specific music to be played when a particular Zone Scene is invoked:

For instance.

Wakeup Zone Scene should link Living Room and Bedroom, set their volumes and play "Wakeup Music" playlist (or a Radio station)

5.2 Relationship to the Alarm Clock

The Sonos Alarm Clock/Music Scheduler allows a user to setup a Sonos system to play music in certain zones at certain times of the day.

In addition it is possible that an alarm clock can also invoke a Zone Scene.

For example. In a system with 4 Zones: Bedroom, Bathroom, Dining Room, Kitchen.

At the end of the day the user has all of the Zones linked into one group.

He has an alarm clock that is set to play National Public Radio at 7am and the alarm should play in the Bedroom and Bathroom, but not the Dining Room and Kitchen.

The Alarm is thus configured to invoke a Zone Scene that links the Bedroom and Bathroom into a group, but leaves the Dining Room and Kitchen out of the group.

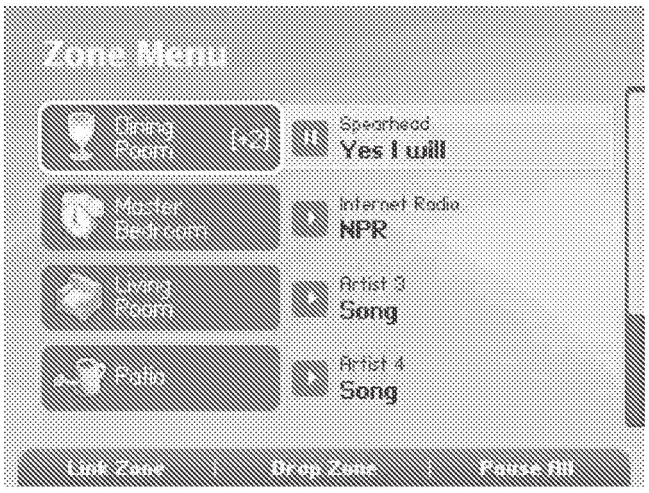
5.3 Compress Zones in the Zone Menu

This concept is aimed at households that have more than a few ZonePlayers.

Current Design.

Zone Groups are shown linked together in a gray box. This is a good design for household with fewer than, say, 8 Zones. With more Zones however, a lot of scrolling is required to navigate between zones.

The design below shows how grouped zones are compressed so that they occupy a ingle item in the Zone Menu. The [+n] signifies the additional number zones that make up the group.



The individual zones in a group WILL show in the Zone bar on the Now playing Screen and Music Browse, as well as the link and unlink screens.

Appendix B

Table of Contents

1 To Do Items

1.1.1 To Do

- Graphic Design for clock face – may need PixelMedia input
- Tone for backup buzzer to be designed
- Scenarios for backup buzzer

1.1.2 TBD items

- Should the low brightness clock face move around the screen as a screen saver (repositioned every once in a while (not sliding around)
- Add play mode (shuffle/repeat)
- Default settings for a new alarm
- Can the DCR sleep timer count in the menu change with time, or does it need to be fixed.
- Should time and date settings fields change if the user has 12/24 hour clock etc.
- Rhapsody and Current Queue as music choices for an alarm.
- DCR state when time is lost (due to power failure)

2 Requirements

2.1 Need

Regular requests from users to provide the following:

- Ability to schedule music to wake to.
- Ability to schedule music at other times. For example, "I want to hear music when I come home from work at 6pm"
- Ability to fall asleep playing music, and for the music to play for a defined period (Sleep Timer)
- Ability to replace their current alarm clock with a large clock view on the Controller.

2.2 General rules for the alarm

2.2.1 Zones

- A single zone can be assigned to an alarm. When the alarm sounds, it will sound in that zone + any zones are linked to the alarm zone at the time of the alarm

2.2.2 Volume ramp

- Alarms will ramp from 0 to the zone's set volume level in 60 seconds (exact time TBD)

2.2.3 Backup Buzzer

If, for any reason, the scheduled music won't play (empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in ZPs –not on a share (for obvious reasons).

The buzzer sound will be designed for Sonos and will fit the Sonos brand

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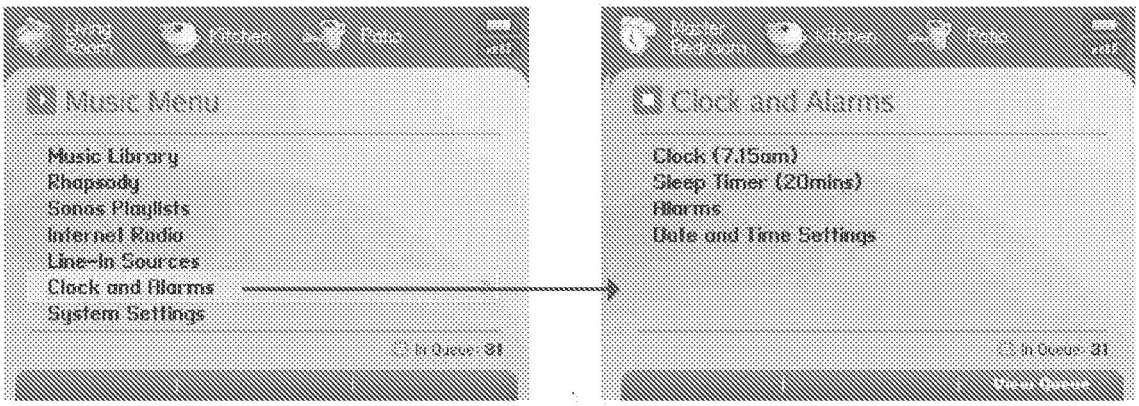
3 UI Spec for Handheld CR

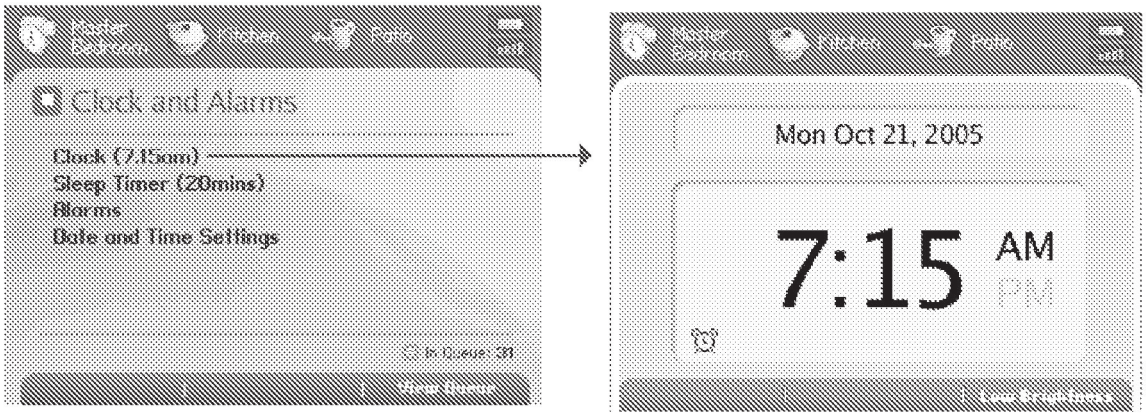
3.1 Clocks and Alarms Menu

– The Clocks and Alarms section of the UI can be found on the Music Menu above System Settings



– The time in parenthesis after the "Show Clock" item should be updated with the current system time.
– The time in the parenthesis should be removed if the system has no time set (because the time was never set properly, or a connection to the Internet time has been lost and the ZP power-recycled)

3.2 Show Clock Screen



- The clock is zone-group contextual.
- Press OK on this screen returns the user to the Clock menu (same behavior as a pop-up).
- Press Back on this screen returns the user to the Clock menu (same behavior as a pop-up).
- The clock icon indicates that one or more alarms are set for this zone group.
- Unlinking a zone, may affect the presence of the alarm icon.
- The 'low brightness' softkey brings up a version of this screen shown below.

3.2.1 Low Brightness mode

- When the user presses the "Low Brightness" soft button, the screen brightness will be reduced to 25%. The user setting in the CR settings will not be affected.
- Pressing any button will return the screen to the user-set brightness.
- When an alarm goes in that zone/group, the contrast will return the screen to the user-set brightness.

3.3 Alarm Plays

Clock Screen

- The clock icon shows if there is at least one alarm in the ON state for one or more of the zones that the CR is currently viewing (in this case Master Bedroom, Kitchen, Dining Room).
- If no alarms are present, in the ON state, for the zone or zones that the CR is viewing, the icon will be removed.
- Note the case where an alarm is set to "Once" - when the alarm is complete (see duration and snooze rules below) the icon will be removed (as long as there are no further alarms set for zones in this group).

Alarm Plays

The clock icon changes to its "active state" (the sound waves).
The snooze softkey appears.

The Snooze and the active clock icon will be displayed:

- For the duration of the Alarm, up to a maximum of 2 hours (if the user has set the duration to 'no limit', the snooze and active clock will show for 2 hours only).
- AND as long as music is playing in that Zone Group. If the music is stopped, the snooze button and active state clock icon are cleared from the UI
- 'Stopped music' can be achieved though:
- Play/pause button
- Clear Queue
- Music Queue ends (runs out of music)
- Technical reason for music stopping (lost connection etc.)

The Snooze button and active clock icon can be passed around zones using link/unlink in the same way as the alarm duration.

Snooze operation

- Pressing the snooze button will cause the alarm to play again 9 minutes later (the actual Alarm settings are not changed).
- Pressing the snooze button again during the 'snoozing period' (the silent period), will offset the alarm by 9 minutes from that point.
- Multiple presses of the snooze button will not accumulate snooze time (9+9+9=27 minutes snooze).
- During the 9 minute snooze period, a 'snoozing' icon will show on the screen
- During the 9 minute snooze period, the clock icon will continue to show its 'active clock' state.
- During the 9 minute snooze period, the Snooze softkey will continue to show.
- If the music is stopped (see rules above) – the snooze state will be cleared (removing the Snoozing icon and Snooze button).

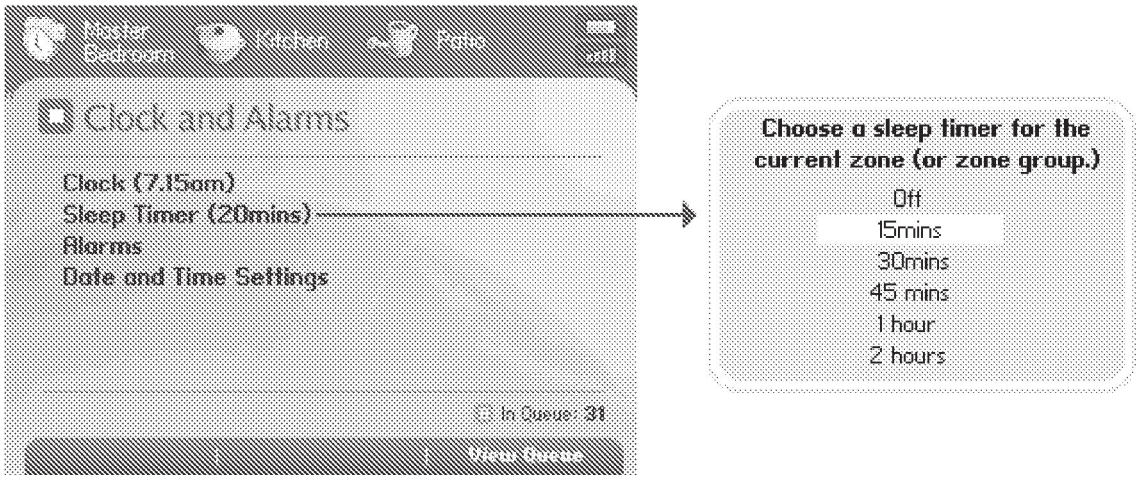
Other items

If another alarm plays for a zone in this group – all the original alarm and snooze states are cleared.

Low Brightness
Same rules apply as described above

–

3.4 Sleep Timer



- Sleep timer will have the following variables: Off, 15min, 30mins, 45mins, 1hours, 2 hours.
- A sleep timer applies to all the current zones in the current group
- When the sleep timer stops (i.e. the time reaches 0 seconds), it should revert to 'Off.'.
- At the end of the sleep time (0 seconds), the current Zone Group should be Paused.
- The time in parenthesis should show the count down.
- If the current zone group is already paused, no changes to the play head will be made.
- (the alarm timer is the same as the sleep time, described later in this document)

Rules for Zone Group changes while the Sleep timer is active

- A Sleep timer is set for the current zone (or zone group) that the user is viewing on the CR. The timer is applied to all the zones in that particular group.
- Any zone added to the zone group takes on the same timer.
- Any zone dropped from the group will have it's timer reset to Off.
- Any zone taken by another group will take the timer of the group it is joining (i.e. it will lose it's original timer).
- Pausing the music has no effect on a sleep timer .
- Clearing the Queue has no effect on a sleep time .
- Altering the Queue (adding, moving, deleting tracks) has no effect on the sleep timer
- The user can change the timer settings while it is running (i.e. turn it off, or change the sleep time).